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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: Kyung Jun Kim)
SERIAL NO: 10/733,650) Group Art Unit: 2825
FILED: December 11, 2003) Examiner: Calvin Lee
TITLE: METHOD FOR POLISHING COPPER LAYER AND METHOD FOR
FORMING COPPER LAYER WIRING USING THE SAME

THE COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, VA 22313-1450
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RESPONSE

Sir:

This is in response to the Office Action dated June 1, 2004 and having a shortened statutory period for reply set to expire on September 1, 2004.

Applicant submits the following response in the above-identified application.

In the Office Action, the Examiner states that Claims 1-13 are pending and Claims 1-13 are rejected.

Claims 1 and 4 are rejected under 35 U.S.C. §102(b) as being anticipated by US 5,137,597 (Curry). Claims 2, 3 and 5 are rejected under 35 U.S.C. §103(a) as being unpatentable over Curry in view of US 6,530,968 (Tsuchiya). Claims 6 and 9-13 are rejected under 35 U.S.C. §103(a) as being unpatentable over Curry in view of US 2004/0014312 (Kunishima). Claims 8 and 13 are rejected under 35 U.S.C. §103(a) as being unpatentable over Curry in

view of Kunishima and Tsuchiya. The Applicant respectfully disagrees with and traverses these rejections.

Independent Claims 1 and 4 indicate that the copper layer is polished by using a slurry having a polishing rate of at least 10,000 /min with respect to the copper layer. In contrast Curry discloses at column 5, lines 52-57 polishing using a slurry at 6 PSI, by which a 17 micron copper/polyimide layer was removed in 10 minutes (17,000 Å/min), which is not the same as removing only a copper layer. From the example experiment discussed in Curry it is unknown what proportion of the copper/polyimide layer is polyimide, and how the polyimide affects the polishing rate with respect to the polishing layer. Thus, The Applicant considers that Curry does not disclose the above-claimed feature of Claims 1 and 4, and does not anticipate those claims.

Claim 2 includes the further feature that the polishing pressure is between 0.1 and 2.0 PSI. The reason for this limitation is to prevent damage to the sacrificial layer pattern (See page 6, lines 14-19). As stated above, Curry teaches a polishing pressure of 6 PSI. The rejection to Claim 2 simply indicates a combination of Curry and Tsuchiya, and an unsupported statement that it would have been obvious to one having ordinary skill in the art to have modified the polishing pressure because one would adjust polishing rotation speed and pressure to result in the most effective polishing process. There is no discussion in the rejection how Tsuchiya is applied in combination with Curry. Furthermore, nowhere in Tsuchiya can any teaching be found of a polishing pressure between 0.1 and 2 PSI. Still further, it would be obvious to one skilled in the art that if the polishing pressure were reduced from 6 PSI for the slurry as taught in Curry, to between 0.1 and 2 PSI as claimed, that the polishing rate would necessarily also decrease (presumably below the claimed polishing rate of at least 10,000 Å/min with respect to the copper layer).

With respect to Claim 3, Tsuchiya does disclose the use of a polycarboxylate polymer, however, there is no teaching that the polycarboxylate

polymer is used in the slurry to increase the polishing rate (See page 6, line 20 through Page 7, line 1 of the present application).

Claim 5 includes both the features of using a polycarboxylate polymer and a polishing pressure between 0.1 and 2 PSI.

With respect to the rejections to dependent Claims 6, 8 and 9-13, the Applicant considers that the above arguments also apply.

Furthermore, the present invention discloses a method of improving a CMP process for a copper layer by using a photoresist layer as a sacrificial layer. By this method a high polishing rate may be achieved. However, none of the cited references teach this claimed method, or the associated problems overcome by using a photoresist layer.

In light of the foregoing response, all the outstanding objections and rejections have been overcome. Applicant respectfully submits that this application should now be in better condition for allowance and respectfully requests favorable consideration.

Respectfully submitted,



Attorney for Applicant
Brian W. Harneder
c/o Ladas & Parry
224 South Michigan Avenue
Chicago, Illinois 60604
(312) 427-1300
Reg. No. 45613

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Date

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